

## **Remarks**

Claims 91-103 are pending in the present application but stand rejected as obvious in view of Araki (U.S. Patent No. 5,882,994) and Kido (U.S. Published Application No. 2001/0014530). Applicant requests that the Examiner reevaluate these rejections in view of the following argument.

One of the standards necessary to establish a prima facie case of obviousness is establishing that the references alone, or in combination, teach or suggest all the elements of the pending claim.

Claim 91 recites forming a first layer against and physically contacting an oxide-comprising layer, with the first layer including semiconductive material and a dopant, and at least some of the dopant physically contacting the oxide-comprising layer. Claim 91, goes on to recite, after forming this first layer, forming a second layer against and physically contacting the first layer with the second layer comprising semiconductive material, the semiconductive material of the second layer being substantially undoped.

To support the rejection of claims 91-103, the Examiner has apparently relied on non-preferred embodiments (page 4 of the office action) as well as the substantial teaching of Araki (pages 7 and 8 of the office action). As the Araki reference has been relied on so heavily by the Examiner, Applicant believes that a thorough review of the Araki reference is warranted. Araki discloses only two floating gate structures; the first floating gate structure being a prior art structure referenced in the background of Araki (Fig. 1, col. 1) and the second being Araki's floating gate structure (Figs. 4-8, col. 3 and 4). No other floating gate structures or embodiments of floating gate transistors are taught or suggested by Araki.

Turning first to the prior art structure described by Araki and referred to as Fig. 1, a cell gate oxide film 83 is formed on a semiconductor substrate 81. A floating gate 84 is formed on cell gate oxide film 83 and an ONO insulation film is formed on floating gate 84. As described by Araki, floating gate 84 is formed by diffusing an N-type impurity, for instance, phosphorous, to attain a uniform density after deposition of polysilicon. With respect to this prior art construction, Araki references no other structure but that which includes a uniform density floating gate 84.

The remaining structure/embodiment is Araki's structure. Araki's structure was considered patentably distinct from the prior art structure described above, and includes a first polysilicon layer 104 formed on a cell gate oxide film 103. The first polysilicon layer 104 of Araki is formed so as to configure a three-layered floating gate structure that includes a non-doped polysilicon/impurity doped polysilicon/non-doped polysilicon.

Araki explains the advantages of this three-layered floating gate structure over the uniform density floating gate structure of the prior art. One advantage, is that the three-layered floating gate does not affect the bottom oxide layer of the ONO layer formed above the gate, nor does the three-layered gate affect the cell gate oxide layer below the gate for at least the reason that there is limited density of impurity within the layer proximate the bottom layer of the ONO layer and/or the cell gate oxide layer. Quite literally, Araki, in contrast to the prior art structure, teaches that because the lowest layer of the polysilicon layer touching the cell gate oxide film does not contain phosphorous, it is easy to avoid damage to the cell gate oxide film in the oxidation process (col. 4, lines 45-50).

In sum, Araki describes two floating gate structures: one of the prior art having a

uniform density floating gate; and another being an improvement over the prior art and having a three-layered floating gate that includes non-doped polysilicon proximate the ONO above the three-layered floating gate and non-doped polysilicon proximate the cell gate oxide below the floating gate.

Claim 91, on the other hand, in pertinent part recites, forming a first layer against and physically contacting an oxide-comprising layer, with the first layer including semiconductive material and a dopant, and at least some of the dopant physically contacting the oxide-comprising layer. Claim 91, goes on to recite, after forming this first layer, forming a second layer against and physically contacting the first layer with the second layer comprising semiconductive material, the semiconductive material of the second layer being substantially undoped. Applicant agrees with the Examiner that Araki does not disclose that the first layer comprises semiconductive material and a dopant physically contacting the oxide-comprising layer (page 3 of the office action) but disagrees that this element is either taught or suggested by any broad disclosure within Araki or any non-preferred embodiment within Araki for at least the reason that Araki's disclosure is limited to two structures/embodiments and neither teaches nor suggests the first and second layers as recited in claim 91.

As discussed above, Araki's disclosure is confined to the uniform floating gate of the prior art and the three-layered floating gate having advantages over the uniform floating gate. No other structures/embodiments are taught or suggested by Araki. Most particularly, no structure having first and second layers as recited in claim 91 is taught or suggested by Araki. Applicant requests that the Examiner direct Applicant to the teaching or suggestion of the claim element which the Examiner has already admitted is

not disclosed by Araki.

On page 4 of the office action the Examiner has gone into great detail to explain that disclosed examples and preferred embodiments do not constitute a teaching away from broader disclosure of non-preferred embodiments. Applicant does not dispute the acceptability of this long list of case law, however disputes the relevance of the case law in the context of the current rejection. This is not a case where the reference or combined references teach the element in some non-preferred fashion or as part of a broader disclosure; this is a case where the prior art fails to suggest the element at all.

In the first instance, the Examiner has relied on the case *In re Susi*, 169 USPQ 423 (CCPA 1971) for the standard that the disclosed examples and preferred embodiments do not constitute a teaching away from a broader disclosure of non-preferred embodiments. This is to be distinguished from the present case in that in *Susi* the references relied on by the Office were a broad disclosure including many embodiments and many sub-genuses of a generic chemical formula. In the present case, Araki discloses only two embodiments, one being of the prior art and one being Araki's invention itself and neither embodiment teaches nor suggests the first and second layers as recited in claim 91.

The Examiner then relies on the case of *In re Gurley*, 31 USPQ2d 1130, 1132 (Fed. Cir. 1994) for the standard that a known or obvious composition does not become patentable simply because it has been described as somewhat inferior to some other product for the same use. In *Gurley* the court found that the nature of the resin was the only significant difference from the prior art circuit material as claimed by *Gurley*. The court found that this epoxy was mentioned in the primary reference as known for this

use however it was referred to as inferior. The key point being that the reference did disclose this element of *Gurley's* claim even though it did refer to it as inferior. In the present case, as admitted by the Examiner, Araki does not teach or disclose all the claimed elements.

The Examiner then relies on *Merck & Co. v Biocraft Laboratories*, 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989) for the standard that a reference may be relied upon for all that it would have reasonably suggested to one having ordinary skill in the art, including the non-preferred embodiments. In *Merck*, a claim to a composition of two compounds administered at a certain ratio to one another was invalidated as obvious over a reference that disclosed both the compounds. This is to be distinguished from the present case where the reference, as admitted by the Examiner, does not suggest an element of the claims.

Lastly, the Examiner espouses the standard that even a teaching away from a claimed invention does not render the invention patentable and recites *Celeritas Technologies Ltd. v Rockwell International Corp.*, 150 F.3d 1354, 1361, 47 USPQ2d 1516, 1522-23 (Fed. Cir. 1998) where the court held that the prior art anticipated the claims even though it taught away from the claimed invention. As the Examiner has already admitted that the cited reference does not teach or suggest all of the elements of the present claims, Applicant requests that the Examiner please explain the relevance of the *Celeritas* case as it involved an anticipating reference or a 102 rejection rather than a 103 rejection as is presently the case.

As mentioned at the outset, to establish a prima facie case of obviousness is establishing that the references alone, or in combination, teach or suggest all the

elements of the pending claim. As recited above, and importantly as admitted by the Examiner, the cited references do not teach or suggest all the elements of the pending claims. Most particularly, the cited references do not teach forming a first layer against and physically contacting the oxide-comprising layer, with the first layer comprising a semiconductive material and a dopant, and with at least some of the dopant physically contacting the oxide-comprising layer. In combination with this, the cited references do not teach, after forming a first layer, forming a second layer against and physically contacting the first layer with the second layer comprising semiconductive material that is substantially undoped. These elements, as recited in claim 91, are not taught or suggested by the cited references. Nor can the disclosure of Araki be considered broad enough to render the pending claims obvious in light of the fact that it only discloses two constructions; one being of the prior art and the other being Araki's patentable construction over the prior art. For at least these reasons, claim 91 is allowable. Claims 92-103 depend from claim 91 and are allowable for at least the reasons cited above regarding claim 91 as well as their own patentable features.

For example, claim 92 recites that the first and second layers are etched to define floating gate wings over the oxide-comprising layer. The cited references neither teach nor suggest floating gate wings as recited in claim 92.

Claims 93 and 94 have been rejected as obvious for the reason that Araki discloses a thickness of the first layer (inner portion) of silicon to be 70nm and a thickness of the second layer (outer portion) of silicon to be 70nm (col. 3, lines 30-32 of Araki). Araki does disclose an inner layer 104 having a 70nm non-doped polysilicon layer which is proximate the cell gate oxide 103; a 70nm polysilicon layer containing

phosphorous that is over and contacting the 70nm non-doped polysilicon layer that is over the cell gate oxide; and a 70nm non-doped polysilicon layer that is over and contacting the 70nm polysilicon layer containing phosphorous. Keeping in mind that claims 93 and 94 depend from claim 91 and thereby include all the limitations of claim 91, Araki does not however teach or suggest a 70nm first layer as recited in claim 91. As recited in claim 91, the first layer is formed against and physically contacting the oxide-comprising layer, wherein the first layer comprises semiconductive material and a dopant with at least some of the dopant physically contacting the oxide-comprising layer. The doped 70nm layer disclosed by Araki and referred to in the office action, on the other hand, does not physically contact the oxide-comprising layer. As such, Araki does not teach or suggest the elements of claims 93 and 94.

Claims 95 and 96 likewise have been rejected as obvious by the Examiner, however it appears that the first layer recited in claim 91 has been confused with the middle layer as disclosed in Araki. As discussed above, the first layer as recited in claim 91 is formed against and physically contacting the oxide-comprising layer. Referring to the office action, the rejection is based on the middle layer of layer 104 as disclosed in Araki having a specific dopant concentration. This middle layer, as disclosed in Araki, cannot be confused with the first layer as recited in claim 91 for at least the reason that it does not physically contact the oxide-comprising layer. For at least these reasons claims 95 and 96 are patentable in view of Araki.

Claim 97 is allowable in view of Araki for at least the reason that the elements of claim 97 are not taught or suggested by Araki. The office action relies on the fact that Araki discloses forming a second layer of polysilicon to have a lower dopant

concentration than the first layer. However, the office action confuses the first layer, as recited in claim 91, with the middle layer of layer 104 as disclosed Araki. The first layer, as recited in claim 91, is formed against and physically contacting the oxide-comprising layer. Layer 104 of Araki on the other hand, includes a middle portion that is doped which is not formed contacting the oxide-comprising layer.

This argument holds true with respect to the office action's rejection of claim 98 as well. The office action confuses the first layer recited in claim 91 with the middle layer of layer 104 disclosed in Araki. As recited above, the first layer as recited in claim 91 is formed against and physically contacting the oxide-comprising layer. The middle layer of 104 relied on by the Examiner is not formed physically contacting the oxide-comprising layer. These arguments also hold true with respect to claims 99-103 as the Examiner has apparently not taken into account the patentable weight of what is recited in claim 91, most particularly, that the first layer is formed against and physically contacting the oxide-comprising layer with at least some of the dopant of the first layer contacting the oxide-comprising layer. As correctly admitted by the Examiner, these elements are neither taught nor suggested by Araki or the Kido references, and as such, the obvious rejection should be withdrawn and claims 91-103 should be allowed.

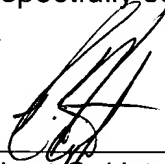
Applicant requests allowance of claims 91-103 in the Examiner's next action. If the Examiner's next anticipated action is to be anything other than a Notice of Allowance, the Examiner is requested to contact the undersigned at (509) 624-4276 between the hours of 8 and 5 (PST).



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Respectfully submitted,

Dated: 4/25/03

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